

4.6 GROUND WATER PROTECTION AND MANAGEMENT

The Lahontan Region includes over 1,581 square miles of ground water basins. Ground waters in the Region supply high quality drinking water and irrigation water, as well as industrial service supply, wildlife habitat supply, and aquaculture supply waters. Ground waters in the Region also provide a source of freshwater for the replenishment of inland lakes and streams of varying salinity.

Historic and ongoing agricultural, urban, and industrial activities can degrade the quality of ground water. Discharges to ground water from these activities include: underground and aboveground tank and sump leaks, agricultural and industrial chemical spills, landfill leachate, septic system failures, and chemical seepage via shallow drainage wells and abandoned wells. Severe ground water overdraft has occurred in portions of the Region. Ground water overdraft can affect beneficial uses of surface waters such as wetlands and springs, particularly in dry areas. It can concentrate trace chemicals, including naturally occurring salts and contaminants resulting from human activities. Overdraft can lead to land subsidence and surface soil cracking. Some soil types (fine grained silts and clays), once compacted, can never again hold as much water upon rewatering of the aquifer. Increased ground water pumping in overdrafted aquifers can draw pollutants toward wells. Imported water used for ground water recharge, if it is of naturally lower quality than local ground water, is a discharge because it contains contaminants above background concentrations (Sawyer 1988). Discharges from some types of construction projects (e.g., placement of fill in wetlands) can reduce ground water recharge.

The resulting impacts on ground water quality from these discharges are often long-term and difficult to remediate. Remediation is often very costly. Consequently, as waste discharges are identified, prompt and expedient efforts to clean up and contain the source areas, as well as to prevent further ground water quality impacts, must be undertaken. Activities that may potentially affect ground waters must be managed to ensure that ground water quality is protected.

The following sections describe the beneficial uses, water quality objectives, and water quality control (implementation) measures specific to ground waters. Much of the information on beneficial uses, water quality objectives, and some of the control measures are described in more detail elsewhere in this Basin Plan. Appropriate references to other parts of this Basin Plan are included.

Beneficial Uses

For purposes of this Basin Plan, "ground water" includes all subsurface waters in the Lahontan Region. Ground water basins in the Region are shown on maps located in Plates 2A and 2B. Beneficial uses applicable to ground waters in the Region include: municipal and domestic water supply (MUN), industrial process supply (IND), agricultural supply (AGR), freshwater replenishment to surface waters (FRSH), wildlife habitat (WILD), water contact recreation (REC-1), water quality enhancement (WQE), and aquaculture supply (AQUA). Beneficial uses of specific ground water basins in the Region are designated in Table 2-2 of this Basin Plan.

Unless otherwise designated by the Regional Board, all ground waters are considered suitable, or potentially suitable, for municipal or domestic water supply (MUN). In making exceptions, the Regional Board will consider the criteria referenced in Regional Board Resolution No. 6-89-94, "Incorporation of 'Sources of Drinking Water Policy' into the Water Quality Control Plan (Basin Plan)," where:

- The total dissolved solids (TDS) exceed 3,000 mg/L (5,000 uS/cm, electrical conductivity) and the ground water is not reasonably expected by the Regional Board to supply a public water system; *or*
- There is contamination, either by natural processes or by human activities (unrelated to a specific pollution incident), that cannot reasonably be treated for domestic use using either Best Management Practices or best economically achievable practices; *or*
- The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day; *or*
- The aquifer is regulated as a geothermal energy

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producing source or has been exempted administratively pursuant to 40 CFR § 146.4 for the purpose of underground injection, or fluids associated with the production of hydrocarbon or geothermal energy, provided that these fluids do not constitute a hazardous waste under 40 CFR § 261.3.

Water Quality Objectives for Ground Water

The Nondegradation Objective (State Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California" is described in Chapter 3 of this Basin Plan and applies to ground waters. Other water quality objectives for ground water consist primarily of narrative objectives combined with a limited number of numerical objectives, and are included in Chapter 3 of this Basin Plan. Ground waters shall not contain concentrations of bacteria, chemical constituents, radioactivity, or substances producing taste and odor in excess of the ground water objectives described in Chapter 3. These objectives define the upper concentration or other limit that the Regional Board considers protective of beneficial uses. These objectives apply to all ground waters, rather than only at a wellhead, at a point of consumption, or at point of application of discharge.

As mentioned above, a limited number of numerical objectives are included in this Basin Plan. The Regional Board is limited in its resources to independently establish numerical ground water objectives for all constituents in all ground water basins.

Numerical ground water objectives for individual ground water basins may be developed in the future. As the Regional Board obtains information which provides more detailed delineation of beneficial uses within basins, revised objectives may be developed to protect these beneficial uses.

Regional Board Control Measures for Ground Water Protection and Management

To protect ground water resources, the Regional Board allows few waste discharges to land. (See the "Solid and Liquid Waste Disposal to Land" section of

this Chapter.) Those that are permitted (e.g., landfills) are closely regulated under existing laws and regulations to maintain and to protect ground water quality for beneficial uses. Another category of discharges to land is individual waste disposal systems (e.g., septic systems). In most instances, the Regional Board has waived its regulation of individual waste disposal systems provided that counties (and some cities) in the Region regulate the systems. Specific provisions of the regulation are included in Memoranda of Understanding (MOUs) with each county or city. The MOUs stipulate that regulation of the systems must comply with all Regional Board requirements (see "Wastewater" section of this Chapter).

Discharges of hazardous and nonhazardous waste, and the waste management units at which the wastes are discharged (e.g., landfills, surface impoundments), are regulated by the Regional Board through waste discharge requirements to properly contain the wastes, and to ensure that effective monitoring is undertaken to protect water resources of the Region (also see "Solid and Liquid Waste" section of this Chapter). These waste discharges are also concurrently regulated by other State and local agencies. Local agencies implement the State's solid waste management programs as well as local ordinances governing the siting, design, and operation of solid waste disposal facilities (usually landfills) with the concurrence of the California Integrated Waste Management Board (CIWMB). The CIWMB also has direct responsibility for review and approval of plans for closure and post-closure maintenance of solid waste landfills. The Department of Toxic Substance Control (DTSC) issues permits for all hazardous waste management, treatment, storage, and disposal facilities. The State Board, Regional Boards, CIWMB and DTSC have entered into a Memorandum of Understanding to coordinate their respective roles in the concurrent regulation of these discharges.

The laws and regulations governing both hazardous and nonhazardous solid waste disposal have been revised and strengthened in recent years. Implementation of these laws and regulations through the following programs is summarized below: California Code of Regulations, Title 23, Chapter 15; Resource Conservation and Recovery Act; Toxic Pits Cleanup Act; Solid Waste Assessment Tests. (See the "Solid and Liquid Waste" section of this Chapter

for detailed control actions).

***California Code of Regulations,
Title 23, Chapter 15***

Referred to as “Chapter 15,” this is the most significant regulation used by the Regional Board in regulating hazardous and nonhazardous waste treatment, storage, and disposal. These regulations include very specific siting, construction, monitoring and closure requirements for all existing and new waste treatment, storage, and disposal facilities. Chapter 15 requires operators to provide assurances of financial responsibility for initiating and completing corrective action for all known or reasonably foreseeable releases from their waste management units. Detailed technical criteria are provided for establishing water quality protection programs, and corrective action programs for releases from waste management units. Chapter 15 requires the review and update of waste discharge requirements for all hazardous waste treatment, storage, and disposal sites by January 1, 1993 and for all nonhazardous waste, storage, and disposal sites by July 1, 1994. Chapter 15 defines waste types to include hazardous wastes, designated wastes, nonhazardous solid wastes, and inert wastes.

***The Federal Resource Conservation
and Recovery Act (RCRA)***

The State implements RCRA's Subtitle C (Hazardous Waste Regulations for Treatment, Storage, and Disposal) through the DTSC and the Regional Boards. In August 1992, the USEPA formally delegated RCRA Subtitle C program implementation authority to DTSC. As described above, regulation of hazardous waste discharges is also included in the California Code of Regulations (“Chapter 15”). (Chapter 15 monitoring requirements were also amended in August 1991 so as to be equivalent to RCRA requirements). These will be implemented through the adoption of waste discharge requirements for hazardous waste sites covered by RCRA. The discharge requirements will then become part of a State RCRA permit issued by DTSC.

Federal regulations required by the RCRA's Subtitle D have been adopted for municipal solid waste landfills (40 CFR Parts 257 & 258). The USEPA has approved California's Subtitle D program (see Section 4.5 for more information about Subtitle D).

USEPA delegation of authority to the State Board for implementation of Subtitle I (Underground Storage Tanks) is pending.

Toxic Pits Cleanup Act

The Toxic Pits Cleanup Act of 1984 (TPCA) required that all impoundments containing liquid hazardous wastes or free liquids containing hazardous waste be retrofitted with a liner/leachate collection system, or dried out by July 1, 1988, and subsequently closed to remove all contaminants or contain any residual contamination.

***Solid Waste Assessment
Tests (SWATs)***

Section 13273, added to the California Water Code in 1985, requires all owners of both active and inactive nonhazardous landfills to complete a Solid Waste Assessment Test (SWAT) to determine if hazardous wastes have migrated from the landfill into ground water. There were 161 sites identified in the Lahontan Region subject to this program. Pursuant to a list adopted by the State Board, 150 site owners statewide per year would complete this evaluation by 2001. The SWAT program is discussed in detail in the “Solid and Liquid Waste” section of this Chapter.

Underground Storage Tank Program

Implementation of the Underground Storage Tank (UST) Program is unique, as the Health and Safety Code gives local agencies the authority to oversee investigation and cleanup of UST leak sites. The Corrective Action regulations (23 Cal. Code of Regs., Ch. 16, Article 11) use the term “regulatory agency” in recognition of the fact that local agencies have the option to oversee site investigation and cleanup, in addition to their statutory mandate to oversee tank permitting, leak reporting, and tank closure. Several local agencies now have the authority (through Local Oversight Program contracts with the State Board or Memoranda of Understanding with the Regional Board) to act on the Regional Board's behalf in requiring investigations and cleanup. The Regional Board retains the authority to approve case closure.

Reports of leaking USTs are submitted by local agencies (city, county, etc.) and by private parties to the Regional Board. Submittals are on a standard form that complies with Proposition 65 notification (Underground storage tank Unauthorized Releases

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[Leak]/Contamination Site Report). The local agencies forward copies of the leak reports to the Regional Board. (See also "Proposition 65 Program" in Section 4.2.)

The cleanup and enforcement elements of the program are shared between the Regional Board and the local agencies. Regional Boards are responsible for oversight of investigation and remediation where unauthorized releases from USTs pose a threat to, or have impacted, water quality. Local agencies, such as County Health Services, are responsible for tank permitting, monitoring, and removal, and the investigation and remediation of releases that do not pose a threat to water quality. Additionally, several local agencies have contracted with the State Board under the Local Oversight Program (LOP) to oversee the investigation and remediation of releases that threaten or have impacted water quality.

The California Code of Regulations, Title 23, Division 3, Chapter 16, contains State regulations regarding underground tank construction, monitoring, repair, release reporting, and corrective action. The objectives of the regulations are to:

- Place all USTs storing hazardous substances, covered by law, under permit;
- Ensure that all existing USTs, covered by law, meet standards for the detection of releases of hazardous substances;
- At the time of application for an UST permit, ensure that all new USTs covered by law, meet standards to prevent releases of hazardous substances;
- Ensure that the UST program complies with the federal UST requirements and secure authorization from USEPA to regulate USTs in the State;
- Identify leaking USTs and decide whether the Regional Board or local implementing agency will have the lead for supervision of cleanup within 90 days of the discovery of a leak. Undertake cleanup supervision of 10-25% of existing backlogged and new leak cases each year. The annual caseload will depend on the severity of the water quality problems and the availability of

Regional Board resources to oversee cleanup;

- Provide funding for eligible local agencies, under a local oversight program, for the oversight of leaking UST cleanup;
- Ensure that appropriate cleanup actions are undertaken in a timely manner at UST sites which have no identifiable Responsible Party (RP) or which have an insolvent RP (orphan site);
- Ensure that all tank integrity tests, conducted within the State, are performed by or under the direct supervision of a licensed tank tester;
- Require all existing underground pressurized piping to be equipped with an automatic leak detector;
- Ensure that all UST owners and operators shall maintain evidence of financial responsibility for taking corrective action and for compensating third parties for bodily injury and property damage caused by a release;
- Require secondary containment for pressurized piping, corrosive protection for tanks, and spill and overfill prevention equipment for UST systems.

Number of UST Cases in the Region

As of July, 1993, a total of 591 leaking USTs had been documented in the Lahontan Region. Of these 591 releases, approximately 150 (25%) have impacted ground water. A list of these UST releases and the status of investigation and remediation at each site is published quarterly by staff of the Regional Board.

Areas With the Greatest Number of UST Releases Affecting Ground Water

Throughout the Lahontan Region several areas have been identified as containing a significant number of leaking USTs that have impacted ground water. Generally, these areas are light industrial/service areas that typically have shallow ground water and/or coarse soils. Because of the significant number of documented releases in these areas, a substantial amount of geologic and hydrologic data have been generated.

UST Cleanup Trust Fund (SB 2004)

In 1991 the State Legislature passed SB 2004, which required that 0.006 cents be paid by tank owners to the State for each gallon of petroleum products stored in a UST. This tax program generates revenue to provide a maximum of \$990,000 grant money per claim for investigation and remediation to those persons who operated or owned USTs that have leaked. The fund reimburses monies that are spent by the discharger during investigation and cleanup. Staff of the Regional Board and State Board are responsible for reviewing technical proposals for investigation and remediation to ensure plans are technically and economically effective.

Dischargers applying for the fund are separated into "A," "B," "C," and "D" categories. These categories are generally based on gross annual income, with "A" applicants having the least income. Since the fund is designed to assist those dischargers with the least financial ability to conduct investigation and remediation, "A" applicants have the highest priority for funding. Since many tank owners and operators lack resources, assistance from the fund increases opportunities for remedial actions.

UST Remediation Goals

Regional Board staff is responsible for ensuring that dischargers are required to clean up and abate the effects of discharges in a manner that promotes attainment of background water quality, or the highest water quality which is reasonable if background levels of water quality cannot be restored. Factors to be considered include: environmental characteristics of the hydrographic unit under consideration, past, present and future beneficial uses of the water, economic factors, and the need to prevent nuisance (CA Water Code § 13241).

Source Removal

The most important factor in ground water remediation is source removal. Sources of ground water pollution at UST sites include leaking tanks and piping, existing soil pollution, and free-phase petroleum products that may be floating on top of the water table. These major sources can feasibly be removed in the short-term at minimal costs as compared to the long-term process necessary to clean up the dissolved phase portion of ground water pollution.

Interim Remedial Actions for USTs

At a site where a leak has occurred from a UST, sources of ground water pollution can be removed in the short-term while investigation of the extent of ground water pollution and ground water remedial design is on-going. Interim remedial actions are considered a cost-effective method of protecting water quality and beneficial uses. Interim remedial actions include the following:

- *Removal of Free-Phase Petroleum Hydrocarbons.* Petroleum products typically spread laterally on top of the water table and within the capillary fringe prior to dissolving into the ground water. Until completely dissolved, this "free product" provides a continuing source of pollution both to the ground water and capillary fringe soils. Removal of this free product can be accomplished while any further investigation of soil and ground water pollution is being conducted.
- *Remediation of Contaminated Soil.* If polluted soils are in direct contact with the ground or surface waters, these soils may pose a continuing threat to water quality and adversely impact beneficial uses. Volatile organic constituents may move within unsaturated soils by leaching or in a vapor phase, which may adversely impact water quality and beneficial uses. This soil pollution can feasibly be removed while investigation of ground water pollution is continuing.
- *Ground Water Pollution Containment.* Containment of ground water pollution as an interim remedial action is necessary if: (a) petroleum constituents in the ground water pose an immediate threat to water supplies or public health and safety, or (b) the pollution plume appears to be migrating off-site at a rate that will limit the dischargers ability to later remediate the pollution. Containment may also be required as a part of overall site remediation.

Dissolved Phase Ground Water Remediation

In cases where ground water has been impacted, dissolved phase ground water pollution must be remediated. Remedial activities shall be conducted to assure that pollution is cleaned up in a manner that: (a) is consistent with maximum benefit to the people of the State, (b) does not unreasonably affect present

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and anticipated beneficial uses of such water, and (c) does not result in water quality less than that prescribed in the water quality control plans and policies adopted by the State and Regional Boards.

Ground Water Monitoring

In order to determine the effectiveness of any ground water remedial action, ground water monitoring will be necessary. Ground water monitoring may also be necessary to track the movement of pollution plumes, and can be used to monitor any natural degradation of ground water pollution.

Reports of Waste Discharge

The Regional Board requires that dischargers file a report of waste discharge (RWD) when any waste is proposed to be discharged to land or surface waters. RWDs are required for treated ground water discharges to land and surface waters, for in-situ soil and ground water bioremediation projects where substances other than oxygen are being discharged, and for large scale ex-situ bioremediation projects where liquids are being discharged. For specific treatment discharges, a listing of information to support a RWD is available from the Regional Board office. Once a RWD is filed, the Regional Board may issue a waiver or may adopt Waste Discharge Requirements (WDRs) for the discharge.

Cleanup Levels

In addition to the following discussion of cleanup levels for soil and ground water at a UST site, reference should be made to Section 4.2 of this Basin Plan.

Section 2725, Article 11, Chapter 16, Title 23 of the California Code of Regulations outlines what elements are required to be included in a Corrective Action Plan (CAP). Section 2725(g) requires the establishment of target cleanup levels for ground water in the final CAP. Any CAP that proposes final ground water cleanup levels above background must include justification demonstrating that the Plan: (1) is consistent with maximum benefit to the people of the State, (2) will not unreasonably affect present and anticipated beneficial uses of such water, and (3) will not result in water quality less than that prescribed in the water quality control plans and policies adopted by the State and Regional Boards.

Prior to the initiation of a corrective action, it may not be feasible to generate sufficient technical

justification to support not remediating ground water to background concentrations. Target levels are recommended to be set at minimum laboratory detection limits (background) for petroleum related constituents. Technical and economic feasibility of attaining background can best be determined during the remedial process. Dischargers shall consider those items listed in Title 23, Chapter 15, Article 5, Section 2550.4d (Cal. Code of Regs.) in presenting their justification. Final justification for not remediating to background levels may include, but not be limited to, chemical transport modelling, evidence of asymptotic concentrations of pollutants over a duration during remediation, and social/economic considerations.

Final cleanup levels may be allowed between background and established water quality standards in certain cases. (Established standards include primary and secondary drinking water standards and USEPA Health Advisory levels.) Any proposal to remediate ground waters to levels between background and an established numerical water quality standard must include a justification for such degradation. Any justification must consider those items listed in Title 23, Chapter 15, Article 5, Section 2550.4d (Cal. Code of Regs.).

The City of Bishop

The majority of documented releases in the Bishop area have occurred in the light industrial/service area along Hwy. 395 (Main Street). Depth to ground water along Main Street ranges from three to eight feet below ground surface (bgs). Ground water dominantly flows east toward the Owens River.

Soils in the Bishop area are variable. Coarse alluvial cobbles and boulders are present on the alluvial fan of the eastern Sierra Nevada range at the western edge of Bishop. However, throughout the City, soils appear to be predominantly clayey sands and clayey silts with low permeability characteristics. A shallow unconfined aquifer is present beneath the City of Bishop at depths ranging from three to eight feet below ground surface. The ground water gradient of this aquifer throughout the City of Bishop is gently sloping. Additionally, the low permeability soils result in slow ground water velocities.

Municipal supply wells for the City of Bishop are located east and north of known petroleum dispensing facilities. No known water supply wells

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are located in areas of known or suspected ground water pollution.

Dischargers at several UST sites in the City of Bishop have installed ground water monitoring wells. The results of well sampling indicate that pollution plumes have little or no natural degradation without active remediation, but these plumes also migrate very slowly.

UST Policy for Bishop. Based on the principles of State Board Resolution No. 92-49, Board staff has developed a policy to set time schedules for completing soil and ground water cleanup. To the extent feasible, schedules will be set to coincide with the availability of resources, including UST Trust Funds. The policy specifically applies to potential Trust Fund "A," "B," and "C" applicants in specific hydrogeologic areas of Bishop. The policy is as follows:

1. When USTs are removed, all identified soil pollution will be excavated to the property boundaries to the depth of the ground water table (depth to ground water in Bishop ranges from 3 to 8 feet below ground surface). Contaminated soil beneath existing onsite buildings will not be required to be removed at this time.
2. Soil samples will be collected from all excavation sidewalls to document effective removal of contaminated soils or the location of any remaining soil contamination that persists offsite.
3. The discharger will remove any fuel found floating on the water table surface.
4. Field investigation methods (such as Hydropunch™ and cone penetrometers) can be effectively used to preliminarily define the lateral extent of ground water pollution. This data will then be used to locate a maximum of three ground water monitoring wells that approximately define the down-gradient extent of ground water pollution. It is expected that these wells will be installed offsite.
5. Monitoring of the ground water will be conducted by the discharger. Monitoring includes laboratory analysis of ground water samples collected from

the installed monitoring wells. The discharger will continue to remove any identified fuel found floating on the water table surface.

6. The UST owner/operator would not be required to perform additional soil or dissolved phase ground water remediation until SB 2004 funding is available, provided that the discharger supplies the Regional Board documentation that a grant application has been filed with the State Board.
7. Dissolved phase ground water remediation would only be required prior to receiving SB 2004 funding if it becomes evident that the discharger will not qualify for SB 2004 funding, or the pollution poses an imminent threat to public health. This policy does not change the overall remedial goals of the Regional Board.

UST Discharges in Hydrogeologic Areas Other than Bishop

Ground water pollution plumes may migrate slowly in other areas of the Region besides Bishop. However, data must be generated in these additional areas that conclusively demonstrates that these conditions exist. In areas where it can be conclusively demonstrated that hydrological conditions similar to Bishop exist, the above policy may be applied to remediation of UST release sites. In areas where pollution plumes do not migrate slowly, failure to initiate ground water remediation in the short-term may result in a substantially more extensive condition of pollution, and may also increase the threat to public health and safety.

Aboveground Storage Tanks

Spills and leaks from aboveground petroleum storage tanks and their associated piping can cause contamination of surface and ground waters. In the past, aboveground storage tanks in California were operated without requirements for secondary containment or for maintaining spill contingency plans.

The State enacted the Aboveground Petroleum Storage Act (APSA) in 1990 (CA Health and Safety Code § 25270, Chapter 6.67). The APSA requires owners or operators of specified aboveground petroleum storage tanks to file a storage statement describing the location and capacity of their facility,

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submit a filing fee, and perform specified spill prevention and response actions. The APSA also grants authority to the Regional Boards to, under certain circumstances, require the installation of leak detection systems, secondary containment, and/or ground water monitoring.

The APSA does not apply to tanks containing products such as propane, which are not liquid at standard temperatures and pressures.

The Regional Board will conduct periodic inspections of aboveground tanks. The schedule of inspections will focus on those facilities which are near navigable waters, potable water supplies, and/or near sensitive ecosystems.

Spills, Leaks, Investigation, and Cleanup (SLIC) Program

Sites managed within the SLIC Program include sites with pollution from recent or historic spills, subsurface releases (e.g., pipelines, sumps), complaint investigations, and all other unauthorized discharges that pollute or threaten to pollute surface and/or ground waters. Investigation, remediation, and cleanup at SLIC sites proceed as directed in State Board Resolution No. 92-49 as described below. (For further details regarding the SLIC Program, see Section 4.2, "Spills, Leaks, Complaint Investigations, and Cleanups.")

Federal Superfund Program

The federal "Superfund" program was established in 1980 with the passage of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The CERCLA provided funding and guidelines for the cleanup of the most threatening hazardous waste sites in the nation. High priority sites scheduled for cleanup under this program are placed on the National Priority List (NPL).

To clean up pollution at federal military sites, the State has signed a Memorandum of Agreement with the Department of Defense which established procedures under which site investigation and cleanup will proceed. Investigation and cleanup at these sites must meet the requirements of the USEPA "Superfund" hazardous waste cleanup program. This involves completion of a formal Preliminary Assessment, Site Investigation, and

Remedial Investigation and Feasibility Study, leading to a Record of Decision on an acceptable Remedial Action Plan. (For further details, see Section 4.12, "Military Installations.")

Implementation of State Board Resolution No. 92-49 "Policies and Procedures for Investigation, Cleanup and Abatement of Discharges Under Water Code Section 13304"

This Resolution contains policies and procedures that all Regional Boards shall follow for the oversight and regulation of investigations and cleanup and abatement activities resulting from all types of discharge or threat of discharge subject to Section 13304 of the Water Code. State Board Resolution No. 92-49 outlines the five basic elements of a site investigation. The Resolution requires that the Regional Board ensure that the discharger is aware of and considers minimum cleanup and abatement methods. (For further details, see Section 4.2, "Spills, Leaks, Complaint Investigations, and Cleanups.")

Ground Water Overdraft and Related Water Quality Problems

Ground water overdraft can affect water quality, particularly in terms of total dissolved solids and organic compounds. (See also "Water Quality/Quantity Issues; Water Export and Storage," in Section 4.9 of this Chapter for additional discussion of ground water problems.)

The Regional Board will consider issuance of waste discharge requirements for ground water recharge with imported water which is of lower quality than local ground water. The Regional Board will also consider issuance of waste discharge requirements for projects which would interfere with ground water recharge. The Regional Board will consider monitoring ground water extraction in contaminated basins to ensure that pumping patterns do not cause the migration of pollutants within the basins, causing contaminants to move to unpolluted areas of the basins.

Agricultural Activities

Irrigation practices, pesticide and fertilizer use, and confined animal operations can adversely impact the quality and beneficial uses of ground water. The Regional Board encourages the use of Best

Management Practices to minimize water quality impacts from these activities.

The Regional Board participates in a statewide monitoring program for pesticides in ground water, as mandated by the Pesticide Contamination Prevention Act (AB 2021). When appropriate, the Regional Board also issues waste discharge requirements to regulate discharges of waste and/or wastewater from irrigated fields and operations such as confined animal facilities. (See “Agriculture” section, later in this Chapter, for further details.)

Stormwater Management

Infiltration of stormwater is a common treatment method (see Section 4.3, “Stormwater”). It allows removal of nutrients and some other constituents through physical filtration or adsorption, and through biological uptake by plant roots and soil microorganisms. However, in areas with high ground water tables, infiltration may lead to ground water contamination by toxic metals, deicing salts, and/or organic compounds which are common in urban stormwater. In these cases pretreatment to remove toxic stormwater constituents before infiltration, or choice of an alternative treatment method may be necessary. Regional Board staff will review proposals for infiltration of stormwater on a case-by-case basis, and place appropriate conditions in waste discharge permits to ensure protection of ground water quality.

Regional Board staff is currently conducting a study to determine the effectiveness of infiltration trenches in the treatment of surface runoff and in the protection of ground water. Three infiltration trenches in South Lake Tahoe are being studied. Ground water up and down gradient of each trench, and soil moisture from varying depths is being collected and analyzed. Data will be evaluated to determine whether any pollutants are entering ground water via the trenches, and whether any reduction of pollutants in runoff is occurring as the runoff percolates from the bottom of the trenches to the ground water. Contingent on available funding, the Regional Board may continue the study over the next one to five years.

Federal Control Measures for Ground Water Protection and

Management

1. A number of federal statutes (e.g., the Clean Water Act, the Resource Conservation and Recovery Act, the Safe Drinking Water Act, the Comprehensive Environmental Response, Compensation and Liability Act, and the Federal Insecticide, Fungicide, and Rodenticide Act) provide the U.S. Environmental Protection Agency (USEPA) with the authority to prevent and control sources of ground water contamination, as well as to clean up existing contamination. USEPA recognized that these authorities to protect ground water were fragmented among many different statutes and were largely undefined. As a result, in 1984, the USEPA adopted a Ground Water Protection Strategy to articulate the problem and USEPA's role in ground water protection. The Strategy provides a system for internal coordination as well as a strengthening of state programs (National Research Council 1986). Guidelines have been issued for USEPA decisions affecting ground water protection and cleanup. The guidelines include a three-tiered system for classification of ground water. Class I is a strict nondegradation category for irreplaceable drinking water supplies and aquifers associated with ecologically vital systems; Class II includes current and potential sources of drinking water and waters having other beneficial uses; Class III consists of nondrinkable water based on existing poor quality and isolation from drinking water aquifers. The USEPA accords different levels of protection to each water class and is developing guidelines on how the classes will be applied. In its Strategy, the USEPA intends to apply its classification system through all of its programs.
2. The USEPA has authority, under Section 1424 of the Safe Drinking Water Act, to designate certain ground waters as “**sole source aquifers**.” There are no USEPA designated sole source aquifers in the Lahontan Region, although ground waters eligible for this designation may exist. Any federal financially-assisted project proposed within an area receiving this designation will be subject to USEPA review to ensure that the project is designed and constructed to protect water quality. The criteria for sole source designation are:

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- The aquifer must be the sole or principal source of drinking water for the area.
- No economically feasible alternative drinking water sources exist within the nearby area.
- If contaminated, a significant public health hazard would result.

Ground Water Control Actions by other State Agencies

1. California does not have statewide comprehensive ground water management laws; management is shared by many agencies using authority provided by various State statutes. The California Department of Water Resources' role in ground water management and protection is to provide technical assistance to other agencies, collect data, and conduct investigations. The responsibility of protecting ground water from pollution is shared with the State Board by other departments within the California Environmental Protection Agency (e.g., Department of Pesticide Regulation, Department of Toxic Substances Control, Integrated Waste Management Board, and Office of Environmental Health Hazard Assessment).
2. California water rights law does not require State permits for ground water diversions, except for underground waters which flow in defined channels (e.g., the lower Mojave River). Possible means of addressing the water quality impacts associated with ground water pumping and overdraft include use of nuisance law, the Public Trust doctrine, and existing State Board authority. Adjudication of ground water rights is also possible; this could result in court appointment of a watermaster, with court-defined authority ranging from monitoring and recording to broad management powers. The State Board may also place conditions to protect ground water in grant contracts or water rights permits for surface water use (Sawyer 1988). Adjudications to protect the quality of ground water is further discussed in Section 2100 and Section 2101 of the California Water Code. Water Code Section 2100 allows the State Board to file a Superior Court action or to intervene in an existing or proposed adjudication proceeding to "restrict pumping, or to impose physical solutions, or both, to the extent

necessary to prevent destruction or irreparable injury to the quality of such water."

3. Improperly constructed, altered, maintained, or destroyed wells (including monitoring wells) are potential pathways for introducing contaminants to ground water. Such wells can act as conductors or pipelines through which waters of varying water quality can commingle. This may result in the degradation of high quality water supplies. The potential for ground water quality degradation increases as the number of wells and borings in an area increases.

Improperly constructed, altered, maintained, or destroyed wells can facilitate ground water quality degradation by:

- Allowing contaminants or poor quality water to enter ground water from the surface.
- Allowing ground water from polluted or naturally poor quality aquifers to migrate (via the well annulus), thus contaminating high quality aquifers.
- Allowing the well bore to be used for illegal waste disposal.

Permanently inactive or "abandoned" wells that have not been properly destroyed pose a serious threat to water quality. They are frequently forgotten and become dilapidated with time, and thus can become conduits for ground water quality degradation. In addition, humans and animals can fall into wells left open at the surface.

The California Department of Water Resources (DWR) is responsible for establishing statewide well standards for the protection of water quality (CA Water Code § 231). State law (CA Water Code § 13801), also requires each county, city, or water agency where appropriate, to adopt ordinances that meet or exceed DWR standards for proper well placement, construction, and abandonment. The same law specifies that local governments which fail to adopt an adequate well ordinance shall enforce the DWR standards. State well standards are found in DWR Bulletins No. 74-81 and 74-90, entitled "Water Well Standards, State of California."

Ground Water Control Actions by Local Agencies

1. The roles of local agencies in regulation of individual waste disposal systems and in oversight of underground storage tanks are described above.
2. County water districts have broad authority to conserve, protect, and replenish ground water supplies. The Subdivision Map Act allows cities and counties to adopt ground water recharge facility plans, construct recharge facilities, and charge a fee for the construction of such facilities as a condition of approval for subdivision maps and building permits (Sawyer 1988).
3. State law permits the formation of local ground water management districts. A few such districts have been established within the Lahontan Region. Local governments should strictly enforce well construction and abandonment standards. Where wellhead protection ordinances have been adopted, they should be strictly enforced.

Recommended Control Actions for Ground Water Protection and Management

1. The potential exists for physical solutions to water quality problems related to ground water overdraft, such as provision of alternative water supplies, artificial recharge, or the establishment of physical barriers or injection barriers to pollutants. Such solutions can be required by the courts in connection with water rights adjudications, or as part of ground water management programs which could include regulation and augmentation of supply. Physical solutions could also be authorized during approval of water development projects. These solutions may involve conjunctive use projects where surface waters are used for ground water recharge or as a substitute supply for ground water users. It is important to manage ground and surface waters as an interconnected resource (Sawyer 1988).
2. Basic data are needed to evaluate potential

threats to ground water quality and beneficial uses. This database should contain information on hydrogeology, soil characteristics, ground water location and level, ground water quality, ground water movement, water well location and construction, ground water extractions, land use, waste discharges, potential and existing pollution sources (e.g., landfills, underground storage tanks, significant quantities of chemicals used in land use practices such as pesticides and fertilizers, concentrated areas of septic system use, and drilling operations) and extent of contamination. A database of this type would also be useful to determine cumulative impacts of discharges and other activities on ground water basins. This database could be maintained by the Regional Board. Most of the information could be obtained from other agencies.

3. Ground water quality monitoring is essential to determine to what extent ground water beneficial uses and water quality are threatened and to evaluate the effectiveness of any actions implemented to protect beneficial uses and water quality. The Regional Board will encourage ground water quality monitoring. All data collected should be entered into STORET or compatible databases.
4. In areas of high septic system density, nitrate and chloride levels should be monitored to detect contamination to ground water from the septic systems.
5. The U.S. Soil Conservation Service, Resource Conservation Districts and U.C. Cooperative Extension Farm Advisors will be encouraged by the Regional Board to promote Best Management Practices such as minimal applications of fertilizers and other chemicals to protect ground waters.
6. The Regional Board will encourage the formation of local ground water management districts. The districts should cooperate with the Regional Board in the regulation of such things as ground water recharge and irrigation practices to conserve ground water.
7. Local governments should consider land use

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zoning to restrict the type and amount of development in critical ground water recharge areas.

8. To conserve ground water resources, the Regional Board will encourage the use of Best Management Practices to minimize water use for agricultural, landscape, and turf irrigation.
9. To conserve ground water resources, the Regional Board will encourage the use of reclaimed water wherever feasible without adversely impacting beneficial uses. (Regional Boards are required, when establishing water quality objectives, to consider the need to develop and use reclaimed water.)
10. Regional Board staff, in reviewing environmental documents for projects which could affect ground water quality, should ensure that CEQA requirements for public disclosure on impacts, alternatives and mitigation measures are fulfilled.
11. The Regional Board should consider holding public fact finding hearings on specific ground water quality/quantity problems. Such hearings could result in recommendations for State Board action.